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charged from the further consideration of the subjects referred to them.

On motion of Mr. S. C. Walker, it was resolved that a Committee of five members be appointed to inquire, and report at the next meeting, concerning the proper course to be pursued for the protection of the principal and accumulation of the trust funds of the Society. Committee, Mr. Walker, Mr. Williams, Mr. T. I. Wharton, Mr. Kuhn, and Mr. G. M. Wharton.

On motion of Dr. Patterson, it was resolved that the Committee on the Museum property be instructed to inquire into the course which, in their judgment, it may be most advisable to take with regard to that property, and that they report to the Society at as early a meeting as practicable.

*Stated Meeting, July 15.*

Present, thirty members.

Dr. PATTERSON, Vice-President, in the Chair.

Letters were read—

From Prof. Zantedeschi, of Venice, dated 27th July, 1841, transmitting a copy of his treatise on the Electrotpe, and requesting a correspondence with the Society:—

From Laurentius Blanco, of Naples, dated March, 1842, transmitting a copy of his work on the Papyri of Herculaneum.:—

From D. F. Van der Pant, dated 10th May, 1842, presenting Vol. VIII. Part 2, of the Transactions of the Society of Experimental Philosophy of Rotterdam, and giving notice of certain deficiencies in the series of the Transactions of this Society, now in the Library of the Rotterdam Society:—and

From Dr. C. W. Short, of Louisville, Ky., dated 25th May, 1842, stating that he had forwarded a parcel, containing dried specimens of plants of Kentucky, for the Cabinet of the Society.

The following donations were announced:—

FOR THE LIBRARY.

- Della Elettrotipia. Memorie di Francesco Zantedeschi. 4to. Venice, 1841.—*From the Author.*
- An Engraved Portrait of Mehemet Ali, from a plate produced by the galvanic process.—*From Prof. F. Zantedeschi.*
- Astronomical Observations made at the Royal Observatory, Edinburgh. By Thomas Henderson, F.R.S. Vol. IV. for 1838. 4to. Edinburgh, 1841.—*From the Royal Society of London.*
- Proceedings of the Royal Astronomical Society. Vol. V. No. 22. 8vo. London, 1842.—*From the Society.*
- Discourse delivered before the Historical Society of Pennsylvania, February 21, 1842, on the Colonial History of the Eastern and some of the Southern States. By Job R. Tyson. 8vo. Philadelphia, 1842.—*From the Author.*
- The Impropriety of Capital Punishments: or the Report of a Committee on Dr. Cuyler's Sermon, &c. 8vo. Philadelphia, 1842.—*From Job R. Tyson, Esq.*
- Proceedings of the Academy of Natural Sciences of Philadelphia. Nos. 11, 12, 13 & 14. For February, March, April & May. 8vo. Philadelphia, 1842.—*From the Academy.*
- Instructions pour l'Observation des Phénomènes Périodiques. Par A. Quetelet. 8vo. Brussels.—*From the Author.*
- Bulletin de l'Académie Royale de Bruxelles. Vol. VIII. Nos. 10, 11 & 12, and Vol. IX. Nos. 1 & 2. 8vo. Brussels, 1841–42. *From the Academy.*
- Nouveau Catalogue des Principales Apparition d'Étoiles Filantes. Par A. Quetelet, Secrétaire perpétuel de l'Académie Royale de Bruxelles, &c. 4to. Brussels.—*From the Author.*
- Annuaire de l'Observatoire Royale de Bruxelles. Par A. Quetelet, Directeur de cet Établissement. 1842. 9me Année. 12mo. Brussels, 1842.—*From the Author.*
- Annuaire de l'Académie Royale des Sciences et Belles Lettres de Bruxelles. 8me Année. 12mo. Brussels.—*From the Academy.*
- Bulletin of the Proceedings of the National Institution for the Promotion of Science. Vol. I. No. 1. 8vo. Washington, 1841.—*From the Institution.*
- Address delivered at the Anniversary Meeting of the Geological Society of London, on the 18th of February, 1842. By R. I.

- Murchison, F. R. S., President of the Society. 8vo. London, 1842.—*From the Author.*
- Journal of the Academy of Natural Sciences of Philadelphia. Vol. VIII. Part 2. 8vo. Philadelphia.—*From the Academy.*
- The American Journal of the Medical Sciences. Edited by Isaac Hays, M.D. New Series, No. 7. For July. 8vo. Philadelphia, 1842.—*From the Editor.*
- Nieuwe Verhandelingen van het Bataafsch Genootschap der Proefondervindelijke Wijsbegeerte te Rotterdam. Vol. VIII. Part 2. 4to. Rotterdam, 1842.—*From the Society.*
- Epitome dei Volumi Ercolanesi del Cav. Lorenzo Blanco. 12mo. Naples, 1842.—*From the Author.*
- Abhandlungen der Mathematisch-Physikalischen Classe der Königlich Bayerischen Akademie der Wissenschaften. Vols. I. & II. and Vol. III. Parts 1 & 2. 4to. Munich, 1832–37–40.—*From the Academy.*
- Astronomische Beobachtungen angestellt auf der Königl. Sternwarte zu Bogenhausen von dem ordentlichen Mitgliede der Akademie der Wissenschaften I. Soldner. Parts 2, 3, 4 & 5. 4to. Munich, 1835–36–37–38.—*From the same.*
- Observationes Astronomicæ in Specula Regia Monachiensi institutæ, et Regio Jussu publicis impensis editæ a J. Lamont. Vols. VI. VIII. & IX. 4to. Munich, 1834–36–41.—*From the same.*
- Ueber das Magnetische Observatorium der Königl. Sternwarte bei München. Von Dr. J. Lamont. 4to. Munich, 1841.—*From the Author.*
- Rede zum Andenken an Ignaz Döllinger Dr. in der zur Feier des Allerhöchsten Namens- und Geburtstages Sr. Majestät des Königs am 25 August, 1841, gehaltenen öffentlichen Sitzung der Königl. Bayerischen Academie der Wissenschaften vorgetragen von Dr. Ph. Fr. v. Walther. 4to. Munich, 1841.—*From the Author.*
- Journal of the Franklin Institute. Third Series. Vol. IV. No. 1. For July. 8vo. Philadelphia, 1842.—*From Dr. Patterson.*

#### FOR THE CABINET.

- A Collection of Dried Plants, made in the State of Kentucky, containing some species, not included in any of the parcels formerly sent by the donor.—*From Dr. Charles W. Short.*

Dr. Patterson stated that he had learned from Mr. Brown, Dragoman to the U. S. legation at Constantinople, that no com-

munication had been received by him in acknowledgment of a donation of coins which he had made to the Society; whereupon, on motion, it was resolved that a duplicate of the usual letter of thanks be transmitted by the Secretaries to Mr. Brown.

The Committee, consisting of Dr. Patterson, Prof. Bache, and Prof. Park, to whom was referred the paper of Prof. Kendall, entitled "Observations on Encke's Comet," &c., reported in favour of its publication in the Society's Transactions; and the publication was ordered accordingly.

Mr. S. C. Walker communicated to the Society the following extract from a letter of Prof. S. Alexander, dated Princeton, N. J., July 14th, 1842, containing the Professor's theory for explaining the remarkable appearance presented by total and annular eclipses of the sun. Prof. A. had taken this early opportunity of laying his views before the Society on a subject which will doubtless cause much speculation in Europe, owing to the occurrence of the remarkable total eclipse of the 7th instant. Prof. A. intended, at some future meeting, to exhibit his reasons in full for the conclusions here announced.

1. If the moon be surrounded by any substance, which can with propriety be termed an atmosphere, the limit of its sensible action upon light will be reduced, in consequence of a permanent terrestrial and anti-terrestrial tide, which will be subject to moderate oscillations of about the same extent with the moon's librations; which tide, however, will preserve a continual accumulation of atmosphere near the point which seems to be the centre of the moon's disc, and that which is diametrically opposite. The elevation of the zone of atmosphere which, in such case, would surround the edge of the disc, must, in consequence, be invariably less than that of almost any other portion. The force of the earth's gravity, tending to produce a tide at the moon's surface, would be more than twenty times as great as that of the moon at the earth's surface, and owing to the feeble gravitation of the moon at her own surface, the same force there would raise a tide some six times as high as at the earth's surface. So that an atmosphere similar to ours would have a tide from the action of the earth about 158 times as high as our atmospheric tides from the action of the moon.

2. Whatever be the constitution of the substance or substances at

the surface of the moon, they exercise an action which at some points deflects, at others inflects, light, producing what (were it not that it cannot at present be asserted that any part of it is due to reflection) might be termed a lunar mirage. In accordance with this general law of action are observed,—the broken cusps, the dark lines, the isolated spots of light of red or other colour, in total and annular eclipses of the sun,—the occasional distortion of planets, the projection of stars upon the moon, and the fact that some of those bodies are not visible at the edge of the moon's disc at emersion, but are first seen at some little distance from it: all of which have been observed in occultations.

3. This action of the moon upon light is *specific*; being more intense in the case of the red ray. Hence many of the phenomena are more readily discernible, when a screen of that colour is employed; though not *altogether invisible*, if the colour of the screen be different. Hence, also, the isolated spots of light, seen during a total eclipse of the sun, are red; and red stars seem to be more frequently projected upon the moon's disc than others.

4. The corona which surrounds the moon during a total eclipse of the sun exhibits—

(a) An interior bright edge, which may be due to the action of the moon.

(b) Just before the emersion, a well defined portion, which seems to mark a comparative vacuum surrounding the sun.

(c) A second portion of more decided density.

(d) A rarer portion, exhibiting in some cases decided radiations, which, as has sometimes been supposed, may be the central part of the substance which produces the zodiacal light.

Mr. Boyè mentioned, that Mr. Clark Hare had communicated to him, that, in conjunction with Messrs. Channing and Gibbs, he had succeeded in producing the perchlorate of the oxide of methule, by the same process which Mr. Hare and Mr. Boyè himself had employed for producing the perchlorate of the oxide of ethule; namely, the distillation of the dry sulphomethylate of baryta and perchlorate of baryta.

This compound resembles, in its general properties, the perchlorate of the oxide of ethule, being a colourless liquid, heavier than water, and exploding with great violence on being touched by an ignited body. The force of its explosion seemed, however, less than that of the corresponding compound of ethule; nor did it appear capable of

being ignited by friction or percussion. It was sweet to the taste, but possessed a pungency which in a short time became painful, and attacked the skin of the tongue, so as to destroy the power of tasting, and to leave the surface white for several days afterwards.

Mr. Boyè remarked that, when the perchlorate of ethule was discovered, the quantity of permanent gases generated by its explosion, and the extreme force with which it scattered the pieces of the vessel in which it was contained, had suggested to him the idea of employing it as an explosive agent, and he had designed making some experiments on this subject, by mixing it with small portions of other substances; but finding it perfectly unmanageable, he had abandoned the attempt. The fact that the perchlorate of methule is not explosive spontaneously, or by friction or percussion, suggested a similar idea; principally as this substance contains more oxygen than is necessary for its own combustion, and, therefore, would probably permit still better the admixture of other combustible liquids, so as to control its explosive force, and abate it so far as to render it applicable to purposes of projection. The advantages of such a liquid over common gunpowder would be, in the first place, that it would yield a much greater amount of gaseous matter; secondly, being a liquid, the whole mass would explode at once, while in common gunpowder a portion of the grains are thrown out without being ignited; and, thirdly, being entirely convertible into gases, it would leave no solid residue, which is a great inconvenience with ordinary gunpowder.

Mr. B. further remarked that, in their paper on the perchlorate of ethule, Mr. Clark Hare and himself had expressed the opinion, that, in explosive violence, it was not equalled by any substance known in chemistry; for, although they had never had occasion to compare it directly with the chloride of nitrogen, there was one point in which it evidently much surpassed that substance; namely, the great distance to which its explosion was perceptible, and the force with which it projected the fragments of the containing vessel. Minute pieces of glass might be seen, where it struck the glass plates of the screen, to have been converted into minute heaps of a compressed powder, protruding above the surface of the glass, under which, on removing the powder, a dent appeared. In order to form a more distinct idea of its power, Mr. B. had calculated the volume of gas given off by the perchlorates of ethule and methule, by chloride of nitrogen, and by gunpowder; from which it appears, that, when the temperature to which the gases are raised by the explosion is assumed to be 1000° centigrade, or 1832 Fahrenheit, which is a little lower than the heat

in the white part of flame, the perchlorate of ethule will yield a volume of gas  $2\frac{3}{4}$  times as great as that yielded by an equal weight of gunpowder, and  $2\frac{1}{2}$  times the amount yielded by chloride of nitrogen; while, if the explosion be supposed to take place in a vessel of the exact capacity of the substance, and strong enough to withstand the pressure exercised against its sides, this pressure would be with gunpowder 1566 atmospheres, with chloride of nitrogen 2852, and with perchlorate of ethule (the specific gravity of this latter being assumed to be 1.4) 5648; or the latter would be  $3\frac{3}{4}$  times that of gunpowder, and twice that of chloride of nitrogen.

Names of the Substances.	Oxygen per cent.	Vol. of gases in cub. centim. at 0° centigr. yielded by one gramme of the substance.*	Composition of the mixture of resulting gases, after explosion, in volumes.	Sp. gr. of the mixture at 0°.	Vol. of gases in cubic centim. at 1000° centigr. yielded by one gramme of the substance.	Same vol. of gas expressed by the bulk of the substance as unity.†	Relative proportions of the numbers in the preceding column.
Gunpowder	35.5	330	{ 3 vol. Carb. acid, 1 „ Nitrogen. }	1.39	1536	1566‡	1.
Chloride of nitrogen		371	{ 3 vol. Chlorine, 1 „ Nitrogen. }	2.07	1726	2852	1.8
Perchlorate of methule	55.8	682	{ 2 vol. Carb. acid, 2 „ Steam, 2 „ Chlorohyd. acid, 1 „ Oxygen. }	1.41	3170	4438§	2.8
Perchlorate of ethule	49.7	868	{ 4 vol. Carb. oxide, 4 „ Steam, 2 „ Chlorohyd. acid. }	0.89	4034	5648§	3.6

\* The steam is here, for convenience, considered not to condense, but to contract regularly from 100° to 0° as a permanent gas.

† This number also expresses the pressure in atmospheres at the moment of explosion.

‡ Gunpowder is here assumed to have the specific gravity of 1.02, as given in Ure's Dictionary, and to have the usual composition of 75 per cent. of nitre. An experiment with Dupont's best Eagle powder, when well shaken together by tapping on the outside of the vessel, gave the specific gravity of 1.055. An analysis of it yielded nitre 77.28, carbon 12.58, sulphur 10.14. It lost by desiccation, in vacuo over sulphuric acid, 0.86 per cent. of hygroscopic moisture, and yielded 0.87 per cent. of ashes, of a bright reddish colour from its carbon.

§ The specific gravity of the perchlorates of the oxides of methule and ethule is unknown, but is assumed to be 1.4, as they are much heavier than water.



The differences will be still more striking, if it be further assumed, that the projective force is not only dependent on the pressure at the time of the explosion, but also on the specific gravity of the gases, or what may be termed their energy; and that, in regard to gunpowder, this effect is considerably lessened by the fact, that, when the explosion takes place in a vessel that yields before the maximum force is attained, a considerable proportion of the powder is thrown out before it can act or be ignited; while, with liquids, the ignition of the whole mass is instantaneous. Mr. B. had no doubt that, in this respect, the force of the perchlorate of the oxide of ethule might be considered more than ten times as great as that of gunpowder. It would also be evident from these considerations, that, in this same respect, the chloride of nitrogen, although considerably inferior to the perchlorates, still greatly surpasses gunpowder; and that a prevalent opinion to the contrary must be founded in a deception, probably arising from the smallness of the quantities of this dangerous substance which can be employed with safety in experiments.

The Committee appointed at the adjourned meeting of the 5th of July, to report in relation to the proper course to be pursued for the protection of the trust funds of the Society, made a report, which was recommitted to the same Committee, with instructions to report at an adjourned meeting, to be held on Friday evening next.

The following gentlemen were elected members of the Society:—

PETTY VAUGHAN, of London.

FREDERICK FRALEY, of Philadelphia.

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*Adjourned Meeting, July 22.*

Present, thirty-five members.

Dr. PATTERSON, Vice-President, in the Chair.

The report of the Committee on the Museum property, under the resolution passed at the adjourned meeting of the 5th of July, was read, and the Society adopted the recommendations contained therein; namely, that the several instru-